



CYTOTOXIC METABOLITES FROM WILD PLANTS AND HAIRY ROOTS CULTURES OF *Linum scabrellum*

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Introduction. Around sixty percent of the medicines used for cancer treatment have been isolated from natural products (Gordaliza, 2007); Podophyllotoxin and its derivatives obtained from the overexploited species *Podophyllum peltatum* and *Podophyllum emodii*, represent important compounds widely used to treat some types of cancers. There is a growing need to detect new natural sources as alternatives for the obtainment of podophyllotoxin. Biotechnological and phytochemical studies conducted in the genus *Linum* allowed to the identification of several cytotoxic lignans. *Linum scabrellum* is a Mexican plant species with high cytotoxic activity against human cancer cell lines (Lautié, 2008), that was previously investigated in our research group. The objective of the work reported herein is to isolate and elucidate the cytotoxic compounds from *Linum scabrellum* wild plant, and from hairy roots cultures of this species.

Methods. Plant material was collected in Queretaro, México, and four extracts were prepared: hexanic, chloroformic, ethyl acetate and methanol. Compounds separation was conducted by column chromatography, and structural elucidation was performed using spectroscopic procedures as ¹H RMN, ¹³C RMN, HSQC, HMBC, DEPT and EM. Genetic transformation of *Linum scabrellum* plantlets was achieved by infecting leaves explants with strain ATCC15834 of *Agrobacterium rhizogenes*.

Results. The chloroformic extract from aerial parts exhibited a strong cytotoxic activity against two cancer cell lines in culture: nasopharyngeal and breast with ED₅₀ values of 0.8 µg/ml and 4.8 µg/ml respectively. Seven compounds were isolated and purified from the chloroform aerial parts extract, as well as from the root extract, and they correspond to phenol, p-cresol, 3-5 dimetilphenol, 2-4 dimetilphenol, coniferin, α-amirin and stigmasterol (Fig.1). Phenol and

its derivatives could be exerting the cytotoxic action. Hairy root phenotypes were obtained when infecting explants with strain ATCC15834 of *Agrobacterium rhizogenes*. Roots emerged after three weeks in culture. Three roots cell lines were established in liquid medium (Fig 8), after two subcultures. Experiments to determine genetic transformation as well as phytochemical analysis, of root cell lines are actually ongoing.

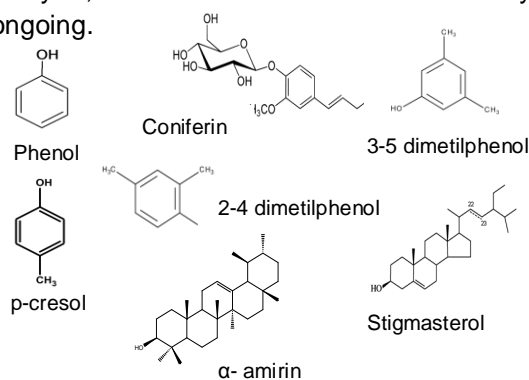


Fig 1. Secondary metabolites isolated and purified from *Linum scabrellum*'s chloroform extracts.



Fig.8 *Linum scabrellum*'s hairy roots.

Conclusions. Three hairy root cell lines of *Linum scabrellum* were established for the production of cytotoxic compounds. Phytochemical analysis was performed for the first time in this species, allowing the identification of three compounds and the characterization of other four secondary metabolites.

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References. 1. Gordaliza, M., 2007. Natural products as leads to anticancer drugs. *Clinical and Translational Oncology*. 9, 767-776.
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